

## Background

As identified in the February 1997 Office of Oversight interim evaluation, there were some concerns about coordination among DOE Headquarters, the Chicago Operations Office (CH), BHG, and BNL during the early phases of the recovery project. Many issues were being addressed and key decisions were being made regarding important project initiatives such as source identification and remediation, placement of additional monitoring wells, and plume mitigation and remediation. However, DOE and BNL were not using a systematic project approval process to ensure that decisions made and options selected were in the best interests of the Department, BNL, and the stakeholders. The February interim evaluation of the BNL HFBR identified several opportunities for improvement related to these concerns. The February evaluation also identified a need to expedite planning for eliminating the tritium source and mitigating the plume and to apply lessons learned to improve environmental management across the site.



**DOE and BNL managers developed plans to address the tritium contamination.**

In February 1997, BHG and BNL restructured the project recovery team and revised the project plan to facilitate a systematic approach to project management and key decisions. The DOE Headquarters support was also strengthened through onsite presence and involvement of the Assistant Secretary for EH; the Director of the Office of Nuclear Energy, Science and Technology (NE); and the Director of the Office of Energy Research (ER). CH developed an action plan to respond to the February 1997 Office of Oversight interim evaluation based on the

opportunities for improvement contained in the report. This CH action plan was subsequently integrated into the “DOE Action Plan for Improved Management of BNL” developed by ER in response to the interim evaluation and the subsequent integrated safety management evaluation.

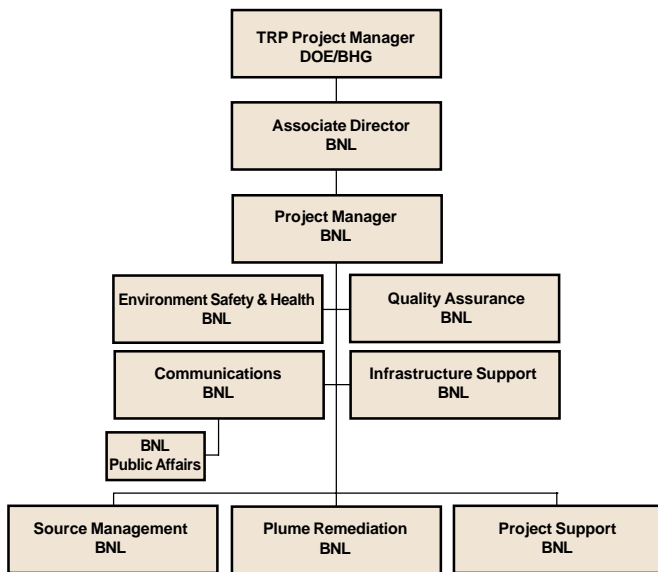
## Results

DOE and BNL are managing the efforts to identify and eliminate the source of the tritium leak and mitigate the tritium groundwater plume through the tritium remediation project. Management of the tritium remediation project presents a significant challenge to DOE and BNL and requires considerable resources and funding. For example, the project involves expediting procurement of equipment, drilling wells, analyzing numerous samples, obtaining regulatory approvals and permits, and accelerating shipment of HFBR spent fuel across state lines.



**DOE senior managers are providing direction to the tritium remediation effort.**

To successfully cope with these challenges, the project has been reorganized several times with the current alignment illustrated in Figure 1. The tritium remediation project is managed by a team led by a BHG project manager and consists of BNL managers and staff. A key factor in focusing senior management attention and DOE resources to improve project management was the Secretary of Energy’s action to bring senior managers from other sites to lead the BNL effort. These managers have been reporting directly on the efforts to implement the project. DOE Headquarters (including ER and NE), CH, BHG,



**Figure 1. Tritium Remediation Project Management Team**

and BNL senior managers provide direction to the tritium remediation project team.

The tritium remediation project is divided into two groups of project activities: source management and plume remediation. A project support organization provides support to the two working groups. Specific project activities assigned to each of the two groups are listed in Figure 2.

Other key activities related to this tritium remediation project include:

- A facility-by-facility environmental vulnerability review by DOE and BNL
- Improvements in management and funding of the groundwater monitoring program for active facilities

Source Management	Plume Remediation
<ul style="list-style-type: none"> <li>• HFBR Article 12 (Suffolk County Sanitary Code of Hazardous Materials Storage and Handling Control) upgrades               <ul style="list-style-type: none"> <li>- Embedded single-walled piping upgrades</li> <li>- Stack drains upgrade</li> </ul> </li> <li>• Fuel pool liner               <ul style="list-style-type: none"> <li>- Conceptual design complete</li> <li>- Liner &amp; leak detection systems</li> </ul> </li> <li>• Fuel pool water management               <ul style="list-style-type: none"> <li>- Decontamination &amp; decommissioning plan</li> <li>- Procurement of new storage tanks</li> <li>- Onsite storage control rod blades</li> </ul> </li> <li>• HFBR equipment level floor joints and penetration repairs               <ul style="list-style-type: none"> <li>- Seal material replacement</li> <li>- Replace floor joints</li> </ul> </li> <li>• Fuel shipments               <ul style="list-style-type: none"> <li>- 3 of 4 fuel shipments completed</li> <li>- DOE approval of supplemental analysis (complete)</li> <li>- NRC approval of shipping container amendment (complete)</li> <li>- All fuel out of reactor</li> </ul> </li> <li>• HFBR upgrade               <ul style="list-style-type: none"> <li>- DOE Order 5480.23, "Nuclear Facility Safety Analysis"</li> <li>- DOE Order 5480.30, "Nuclear Design Criteria"</li> </ul> </li> <li>• HFBR source identification               <ul style="list-style-type: none"> <li>- Leak rate testing</li> <li>- fuel pool</li> <li>- Horizontal drilling</li> <li>- Identification HFBR effluents and monitoring</li> </ul> </li> <li>• HFBR transition planning               <ul style="list-style-type: none"> <li>- Transition modification plan</li> <li>- Basic Energy Sciences Advisory Committee review (complete)</li> <li>- Public outreach meetings</li> <li>- DOE decision on restart or deactivate</li> <li>- Cost and schedule review</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Plume profile               <ul style="list-style-type: none"> <li>- Plume map redrawn</li> <li>- Characterization of west side of plume</li> <li>- Tritium compilation report</li> </ul> </li> <li>• Vertical profile wells (74)</li> <li>• Permanent well installation</li> <li>• Plume sampling &amp; analysis               <ul style="list-style-type: none"> <li>- Analysis: full range radioisotopes and VOCs</li> </ul> </li> <li>• Pumping of leading edge of plume               <ul style="list-style-type: none"> <li>- 120 gpm pumping</li> <li>- 3 extraction wells</li> <li>- Carbon filters removing VOCs</li> <li>- Recharge basin monitoring wells installed</li> </ul> </li> <li>• Air monitoring plan               <ul style="list-style-type: none"> <li>- Recharge basin air monitors installed</li> </ul> </li> <li>• Evaluation of long-term alternatives               <ul style="list-style-type: none"> <li>- Institutional controls</li> <li>- Containment</li> <li>- Discharge</li> <li>- Evaporation</li> <li>- Monitoring (equilibrium)</li> </ul> </li> </ul>

**Figure 2. Tritium Remediation Project Activities**

- Response to additional groundwater contamination findings and events, including:
  - Pile fan sump contamination
  - Brookhaven Medical Research Reactor (BMRR) groundwater contamination
- EPA Multi-Media Review
  - Phase I - Regulatory Compliance Assessment
  - Phase II - Process Waste Assessment
  - Phase III - Environmental Management System Review

Additional information on the management and status of the tritium remediation project efforts is included in the applicable sections of this report.

CH has been supportive of the facility-by-facility vulnerability review conducted at BNL. By arranging for review team representatives from other DOE laboratories, CH increased the experience of the review teams and provided a mechanism for carrying lessons learned back to these other laboratories. At the present time, CH is not actively engaged in management of the tritium remediation project but has provided appropriate technical support to BHG on request.



**DOE and BNL have made substantial progress in resolving the tritium plume problem.**

DOE and BNL have made substantial progress on the identification and remediation of the HFBR tritium groundwater plume since the February 1997 Office of Oversight interim evaluation. The status of the project is communicated with DOE, BNL, regulators, and stakeholders through weekly status meetings and reports, monthly project reports and stakeholder and employee outreach programs. Tritium remediation project accomplishments completed since January are identified in Figure 3.

These accomplishments have been completed on schedule, and additional planned actions are proceeding on schedule. Ongoing actions include preparations to drain and line the spent fuel pool to eliminate the tritium leak source and to manage the groundwater tritium plume. The HFBR and the reactor building are being modified to prevent any potential additional leaks.

- Three of four HFBR fuel shipments complete (last shipment is scheduled for September)
- All fuel removed from the reactor
- Leading edge of the plume being pumped to recharge basin
- Air monitors installed at the recharge basin HFBR
- Safety analysis report revision is in progress
- Plume profile map redrawn
- 74 vertical profile wells installed
- 36 of 38 permanent wells installed
- Spent fuel pool liner and leak detection system conceptual design complete

**Figure 3. Key Project Accomplishments**

## Assessment of Project Management

Both DOE and BNL are providing strong leadership to the tritium remediation project. Schedule milestones and objectives are generally being met, and some activities are ahead of schedule. The environment, safety and health (ES&H) and quality assurance (QA) representatives on the project have been elevated to report directly to the project manager. Interviews indicate that project management as well as DOE and BNL senior management have been very responsive to ES&H and QA issues related to the project.



**A cooperative effort by DOE, BNL, regulators, and stakeholders has contributed to progress on the tritium remediation effort.**

The success of the tritium remediation project to this point is attributable to an effective and cooperative effort between DOE, BNL, legislators, regulators, and stakeholders and the hard work of the dedicated staff within BHG and BNL. Regulators, including the Nuclear Regulatory Commission (NRC), the EPA, the Suffolk County Department of Health Services (SCDHS), and the New York State Department of Environmental Conservation (NYSDEC), have been particularly supportive of the project through the accelerated review and approval of proposed actions and permits. This cooperation was demonstrated through the accelerated approval and implementation of the shipments of HFBR fuel, and approval of the

tritium plume pumping system. This exceptional coordination and cooperation between all parties associated with this project should be improved even more by the recent formation of the Brookhaven Executive Round Table. This committee, which includes regulators, stakeholders, and community members, presents a forum for frequent, routine, and executive level communications about BNL and integration of activities related to BNL with the community.

Overall, the management of the tritium remediation project has been effective, and progress has been substantial. However, there are a number of upcoming challenges that require continued DOE and BNL attention:

- Resolution of significant issues identified by the environmental vulnerability review
- Continuing groundwater contamination discoveries
- Pending change of the operating contractor and related transition costs
- Potential funding reductions for BNL operations
- Potential downsizing of DOE or BNL staff.

These factors have the potential to divert resources and/or management attention from the tritium plume remediation effort. Continued management attention will be needed to manage these challenges and ensure that the tritium remediation effort is completed effectively and on schedule.